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WATER POLLUTION PROBLEMS IN IDAHO IN RELATION TO THE AQUATIC RESOURCE

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Although the State of Idaho is fortunate that it does not have the multitude of water pollution problems confronting many other states, pollution of Idaho waters poses a serious threat to a multimillion dollar resource that sup-ports fishing, hunting, and other water-oriented recreation. If we take into account other water uses, for example, domestic, agriculture, and industry, no dollar sign can realistically be placed upon Idaho's water resources.

Definition of Pollution

Before we discuss some of Idaho's problems, let us define the word "pollution." This term has been loosely used and tends to mean different things to different people. The following sentences quoted by Dr. Clarence Tarzwell, I believe, correctly define the term: "Pollution is the addition of any material or any change in water quality or character that interferes with, lessens, or prevents its use for a desired purpose." "Under this definition, pollution is tied to usage and water is not polluted unless its desired use is adversely affected."

Source of Water

The potential supply of water for the United States is roughly 1,300 billion gallons a day--ail from precipitation. Three-quarters of this amount is returned to the atmosphere via evaporation and plant transpiration. The other one-quarter, or 325 billion gallons daily, runs into streams and lakes or percolates into underground aquifers; THIS IS OURS!

Approximately 46 percent of this water demand goes to industry, 46 percent to agriculture, and the other 8 percent is used for domestic purposes, if water is heavily polluted, it cannot be reused. Without clean water, a nation

cannot grow or long survive.

Water pollutants generally fall into one or more of the following six categories: Putrescible wastes, inert inorganic materials, toxic wastes, thermal wastes, radioactive wastes, and contaminants or tainting materials, Each of these will be discussed separately in relation to its influence on Idaho's aquatic resources.

Putrescible Organic Wastes

This type of pollutant includes sewage and all organic material that can be decomposed by bacterial action. These wastes are one of Idaho's biggest water pollution problems, particularly in the southern part of the State.

The food processing industry in Idaho has expanded by leaps and bounds during the past ten years. The processing of sugar beets, potatoes, and other vegetables has become the major industry.

Unfortunately, in this type of processing, many wastes are created, including such materials as potato peelings, culled potatoes and french fries, starch, beet pulp, and dissolved sugars, Since it has always been simple to dispose of wastes in running water, these plants are located along rivers where their effluents may flow in with little or no expense. It is the old "out of sight, out of mind" attitude. Most of these ingredients have a high biochemical oxygen demand and may reduce the dissolved oxygen level to critical levels for aquatic life and cause heavy mortalities.

An excellent example of the deleterious effects wastes of high oxygen demand may have upon aquatic life is the annual fish kill which occurred in Milner Reservoir, located on the Snake River, in south Central Idaho during each of the winters of 1959 through 1962. A combination of tremendous loads of organic wastes from upstream food processing plants, ice cover, and low river flows, resulted in the second highest pollution-caused fish kill in the Nation in 1960.

Since most of the food processing plants are located in Southern Idaho, the Snake River and many of its tributaries receive the brunt of this type of organic waste. Where are approximately twenty food processing industries emptying organic wastes directly or indirectly onto the main Boise River alone, a major tributary of the Snake River.

Not to be forgotten, of course, are the untreated domestic wastes which still enter many of our streams and rivers. At the present time, this problem in Idaho is mainly with the smaller communities however, some small towns release untreated domestic wastes into small ditches and streams which automatically become a health hazard to anyone living in the area.

It has been pointed out that one of the more deleterious effects of organic wastes in the stream is the reduction of dissolved oxygen in the water to levels which are too low for survival of aquatic organisms. Most of these wastes are also rich en nitrates, phosphates, and other nutrient materials which can trigger a builde-up of algae and bacterial slimes in a stream. Even the effluent from a sewage plant is rich in nutrient elements.

Algae and slimes can blanket a stream bottom causing suffocation of fish-food organisms thus depleting the fish-food supply. If these forms are abundant enough, they can suffocate eggs of fish spawned in the gravel. The aesthetic value of a stream does not improve either with addition of these organic nuisances. The main Boise River and several smaller Snake River tributaries have been adversely affected by the blanketing effect of algae and slimes.

A stream or river containing much nutrient-rich organic matter flowing into a lake or reservoir may result in an extensive bloom of blue-green algae occurring in the impounded water. These blooms not only ruin the aesthetic value of such a body of water and cause taste and odor problems but, upon decomposition, help reduce the dissolved oxygen in the lower strata of water. A good example of this phenomena is Brownlee Reservoir, an impoundment on the Snake River lying

on the Oregon-Idaho border. During the warm summer months, the dissolved oxygen levels throughout much of this reservoir are extremely low. The decomposition of prodigious algae blooms are given partial credit for the effect.

During the past few years, progress has been made in the abatement of our organic pollution problems. Many of the food processing plants have installed primary treatment facilities which remove most of the solid materials formerly entering our waters. However, the dissolved materials high in "BOD" and nutrient value are still a problem. A few of the larger plants are considering installing secondary facilities for treating dissolved solids.

The recent installation of several municipal sewage plants in the State has aided immensely in removing many of the domestic wastes that formerly entered our waters. However, much is left to be done.

Inert inorganic Materials

A pollutant that affects many streams and rivers throughout the State and its familiar to all of us is common soil. Silt naturally enters during spring runoff periods and during freshets. However, man can cause silt to be an almost permanent addition to our waters.

Some examples of man’s influence on the addition of silt to our Idaho waters are. Placer mining, logging, other types of poor soil management resulting in erosion, road building, irrigation return flow and wash water from food processing industries. There are more but these cover the major causes.

Heavy silting of a stream disrupts the aquatic balance by first smothering the bottom organisms present and then completely eliminating the aquatic insect habitat by creating a sandy, constantly shifting stream bed. Silt may also smother incubating eggs or reduce water seepage through gravel beds causing high egg mortality of important game fish species such as trout and salmon. It may eventually destroy important habitat by covering the gravel permanently.

Silt has also been given credit for increasing the water temperature of a stream.

Erosion caused by logging or road building has indirectly been a large factor in the silting of some of our major anadromous streams such as the South Fork of the Salmon River. During the flooding in December and January (1964-65), the denuded hillsides in portions of this area offered no watershed protection and consequently, tons of silt and sand poured into the South Fork channel, blanketing many of the prime salmon spawning areas. The addition of soil to our waters is one of the worst pollution problems in the western United States and is probably the most difficult one to control.

Continuous silt deposits in lakes from upstream river sources eventually reduce depth, and in a shallow lake already on the border line of depth, could result in winter kill the lake freezes over during winter months.

A side effect of the mining industry, although not really falling into a pollution category, is the elimination of fish habitat. When a section of stream is dredge mined, besides the obvious silt problem that results, the mining may remove stream bank cover (causing increase in water temperature); remove riffle and pool structure; and reduce depth and velocity by widening the stream channel.

Toxic Wastes

Pesticides

In recent years with the widespread use of pesticides, loss of fish and wildlife has increased alarmingly throughout the Nation. In 1960, some 637 million pounds of synthetic organic pesticides were manufactured in the United States. This has increased each year since then. A certain amount of these materials reaches our waters either directly or indirectly with consequent harm to the aquatic biota. Since 1961, agricultural poisons have led all known sources of fish kills nationwide.

In Idaho where agriculture is the root of the economy, pesticides are used extensively to control insect and other biological depredation to crops, timber, and other lands. Many of these synthetic organics do not decompose readily and upon entering the water most of them are capable of killing fish and particularly fish-food organisms at very low concentrations. These compounds may also have long-term cumulative effects on fish and wildlife, and we are only very recently beginning to discover what some of these effects may be.

Many streams in Idaho during the past few years have suffered extensive losses of aquatic insect life due to the spraying of surrounding areas with malathion and DDT for the control of grasshoppers and spruce budworm, respectively. How drastic these losses affect the fish populations present cannot be determined overnight. It has been observed, however, that stone fly and caddis larvae do not come back in great abundance The year following a drastic depletion of these forms in a stream.

Studies initiated on C. J. Strike Reservoir in 1965 to determine if the drastic reduction of crappie and bass could be due to pesticides so far has not resulted in significant answers. Although samples of water, algae, and fish do show various concentrations of chlorinated hydrocarbons present, it cannot be determined how important these concentrations are until further more extensive research is done,

In Idaho, the annual aquatic weed removal in irrigation ditches during the spring and summer months with chemucal herbicides, particularly the aromatic petroleum solvents, often leads to fish mortalities as many of these chemicals are quite toxic to aquatic life,, especially in the high concentrations frequently used.

Heavy Metals

Another source of toxic waste in the State comes once again from the mining industry. The mining for heavy metals, such as copper, lead, and zinc,

often causes releases of toxic wastes into a stream. Very minute amounts of heavy metals may be very toxic to aquatic life, depending to some extent on water chemistry. The South Fork of the Coeur d' A1ene River for many miles of its length is virtually a biological desert due to the continuous long-term release of mining wastes containing toxic materials into its waters. This situation has existed for many years.

Detergents

A toxic pollutant that has received a good deal of publicity during the past several years is the synthetic household detergent. Due to the chemical properties of most of these detergents, bacteria cannot decompose them. Therefore, they pass through a sewage treatment plant relatively unchanged.

An ingredient found in most of these detergents "alkyl benzene sulfonate" (ABS) has been found to be quit toxic to fish and in 1959, a fish kill occurred in the Boise River during a low flow period which was attributed to this detergent ingredient. With the advent of bio-degradable detergents, this problem may be on the way out.

Phosphate industry

In Eastern Idaho, wastes from phosphate chemical plants enter the Portneuf and Bear Rivers. Fish kills have been attributed to excess acids and fluorides in these waters.

Pulp Mills

Pulp mills, of which Idaho has but one, a Kraft plant at Lewiston, can create toxic problems, particularly where the effluent enters the river with very little dilution water. Some problems have existed on occasion at this plant; however, with its effluent entering the Snake River, usually enough dilution water is present. The numerous pulp mills on the Pacific Coast cause

many pollution problems.

Thermal Pollutants

The warming of water to unsuitable tempertatires for fish life occurs frequently in areas where industries use river waters for cooling purposes and then release the warm water back into the river. Steam-generated electric power plants are creating local temperature problems in eastern cities which are expected to become more widespread in the future. Increases In water temperature also decreases the dissolved oxygen in water.

Thermal pollutants have not been a great problem in Idaho although effluents from the phosphate plant near Pocatello reach temperatures of 104^0 F. However, due to a cold spring entering the river directly below the effluent, no adverse effects have been observed.

Radioactive Wastes

Radioactive wastes are similar to silt and pesticides in that they do not always originate at a point source but may come from entire watersheds. The effect of these wastes on aquatic life in natural waters in Idaho are at present an unknown quantity, but we are sure to hear more of them.

Contaminants or Tainting Materials

Certain materials added to waters have properties causing tastes and odors in the water and actual tainting of fish flesh. Some examples of these are: Kraft pulp mill effluents, chlorophenols, naphtha-based herbicides, petroleum wastes, chlorinated hydrocarbons and chlorine. Some of these have caused local problems throughout the State.

What Are The Answers

Reams of data have been collected over the past few years by many agencies concerning the effects of various pollutants on our aquatic resources.

However, the solution to many of these problems remain unsolved.

The emphasis has been on "cleanup" of organic wastes which are actually the easiest to show some progress on. However, the emphasis is going to have to be shifted to controlling the most difficult problem—land and water management.

Better irrigation practices reducing the silt and nutrient properties in irrigation return flow, such as the sprinkler method, must be discovered.

Better logging methods which do not rape the land and cause costly erosion have beer devised and must be more frequently used. Better range management is needed on our overgrazed rangelands.

One of Idaho's problems and a big one in the western states has been the curtailment of downstream dilution water when dams are built. Many of our organic pollution problems stem as much from lack of dilution water to handle the wastes as the wastes themselves. This is particularly true where reservoir water is primarily stored for irrigation and no allowances are make for sufficient water downstream from the dam for fishery purposes. Frequently the water is cut off to a trickle after the irrigation season terminates. Minimum flows for downstream releases must be written into all future dam projects.

If we are to maintain a sound, health economy, the water resources of the State must be protected and the water quality maintained at a high level for domestic use, industry, recreation, and fish and game.

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